Decisional Fit under Turbulent Circumstances

Cécile Godé, Jean-Fabrice Lebraty

Decisional Fit Under Turbulent Circumstances: The Case of French Fighter Pilots on the Battlespace[1]

Cécile Godé-Sanchez
Jean-Fabrice Lebraty

❐ Résumé

Le but de cette communication est d’étudier les effets d’un nouveau système décisionnel centré réseau (appelé L16) sur la performance des décisions prises. Fondé sur le modèle de la décision en adéquation, nous démontrons que la L16 est en adéquation avec la représentation interne du problème développée par le décideur ainsi qu’avec la tâche qu’il doit exécuter. Nous proposons néanmoins certaines améliorations susceptibles d’accroître le niveau d’adéquation.

Mots clefs :
Systèmes d’aide à la décision, Modèle d’adéquation, prise de décision en situation, conscience de la situation, performance décisionnelle.

❐ Abstract

The purpose of this communication is to study the effect of a recent networking decision support system (called Link 16) on decision performance, within the specific context of military operations. Based on a new decision model - the Decisional Fit Model – we demonstrate that Link 16 fits with task characteristics and decision maker internal representations of the problem domain. However, improvements could be considered in order to increase the level of fit.

Key-words:
Decision Making, Fit Model, Decisional Fit, Decision support System, Coping strategies.

1 Ideas expressed in this paper are those of the authors and do not reflect the position of the French Ministry of Defense nor of the French Air Force.

1. Introduction

In Afghanistan, French fighter pilots are deployed on a daily basis to support friendly forces on the battlefield. As the news often remind us, such air operations are quite dangerous and pilots have to perform decisions under stressing circumstances. Currently six Rafale are engaged in Afghanistan. They are equipped with a networking decision support system (ThÃ³rlindsson) called Link 16, and this supports the conduct of the mission.

In this paper, we focus on Link 16 to analyze the way it influences decision performance within the specific context of military operations. More precisely, our research question can be stated as follows: **How do net-centric technologies affect decision performance?**

We build our analysis on the well known Technology-Task Fit (TTF) literature (Goodhue & Thompson, 1995; Zigurs & Khazanchi, 2008), which especially examines DSS consequences on decision performance (Kohli & Devaraj, 2004; Todd & Benbasat, 1992; Williams, Dennis, Stam & Aronson, 2007). Because objective measure of system performance has not been developed yet, the TTF perspective proposed surrogate measures in focusing on users' evaluations and perceived value of the system (Davis, Bagozzi & Warshaw, 1989; Goodhue, 1995; Goodhue, Klein & March, 2000). In this paper, we adopt such an approach in exploring users' perception of link 16 ability to perform task requirements.

Our research question is of theoretical and managerial interest. The theoretical interest relates to the decisional fit model we develop; and this considers the examination of the relations between a task, a decision maker and a system. Such a model is drawn from the fit model category. The managerial interest relates to practical implications of our model since it provides new perspectives to understand the effects of networking technology usages for people who are engaged in turbulent situation.

To address this relevant research question, we conducted an explorative case study (Yin, 2003) based on a research contract funded by the French Ministry of Defense. Executed by the research team of the CReA[2], this contract especially highlighted the problem of acquiring new capabilities in relation with the introduction of the multi role fighter aircraft Rafale.

This paper is divided into five parts. Based on a concept-centric literature review (Webster & Watson, 2002), Section 2 introduces our model of decisional fit. Section 3 details our research methodology. Section 4 presents our case study results. Finally, section 5 develops some conclusive remarks.

[2] Research Center of the French Air Force (Centre de Recherche de l'Armée de l'air – CReA)

2. Theoretical Background: The Decisional Fit Model

Our framework leads to study the link between decision maker in natural settings and the performance of his decision. Our model is based on the Task-Technology Fit Model (Goodhue & Thompson, 1995) and its variations (Todd & Benbasat, 2000), as well as the Cognitive Fit Model (Shaft & Vessey, 2006; Vessey, 1991). As other Fit Models, we postulate that decision performance is dependent upon the fit between three constructs (Decision Maker, System and Task). Putting together, these constructs leads to a specific decisional behavior. The following figure displays our model:

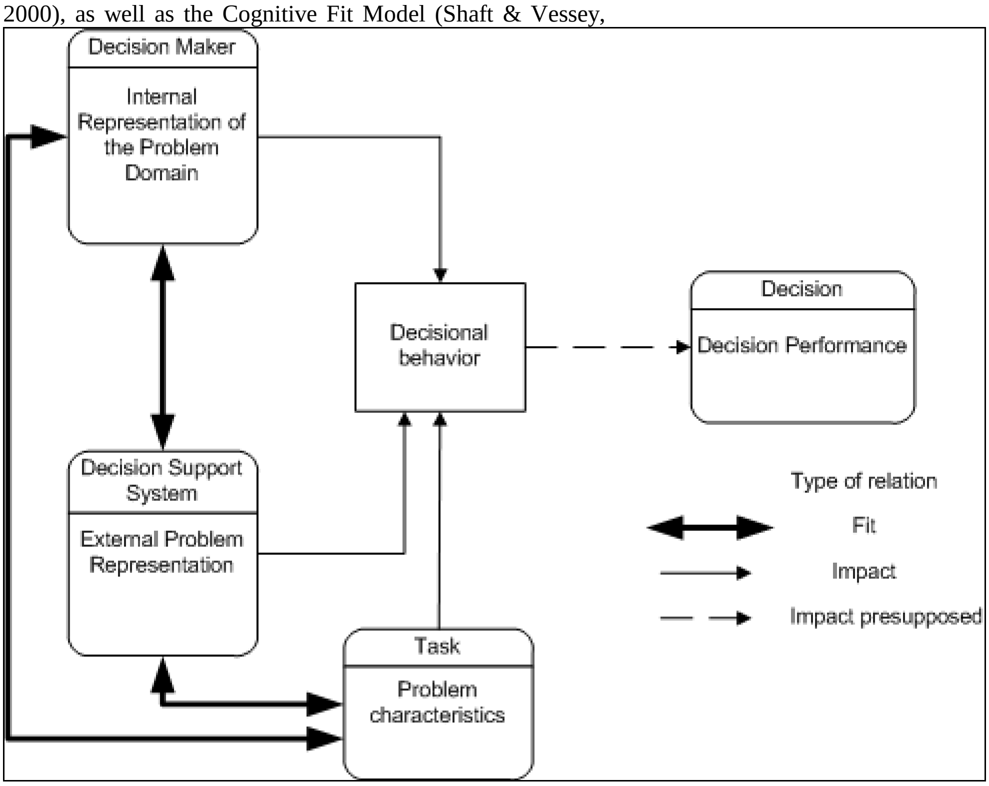

Figure 1 : General Decision Fit Model

2.1 Key Components of the DF Model

This section details the three elements composing the DF Model:

- Decision Maker: he plays a critical role in our model since he appears twice. First, he is able to develop an internal representation of the problematic situation he has to deal with. Following the TTF perspective, such an internal representation depends on (1) individual abilities like motivation and attitudes to risk for instance, (2) individual prior experience in running the task and (3) the decision model individual learned and internalized during training times and which significantly structures the mental picture of the problem he faces. Second, the mental representation of the task solution is related to a recognition process, occurring in individual mind. Two different kinds of decision maker can be found in literature: the expert and the novice. Many definitions seek to define the concept of expertise. Farrington-Darby & Wilson (2006) proposed a large one: “*Expertise can describe skills, knowledge or abilities, in tasks, activities, jobs, sport and games. It can refer to a process such as decision making or it can refer to an output such as a decision*”. In that way, we can consider that expertise is the ability to discover what we do not know. This is due to learning and experience. On the contrary, novice does not have an intelligible vision of the picture he copes with. As a result, one of a significant difference between expert or novice concerns the use of system, especially DSS (Hung, 2003).
- Task: in our model, the task is decisional. With regard to the classical typology of decision making literature (Gorry & Scott Morton, 1989), we focus on semi-structured decision making process since (1) structured decisions do not need an interaction between DSS and decision maker and (2) DSS is quite needless to support non structured decision making process. In our model, task represents the mission decision maker has to achieve. In turbulent situation, individual has to react quickly in order to make an appropriate decision. This is the reason why our DF model presents a double arrow linking task to external problem representation depicted by DSS and to internal problem representation developed by decision maker.
- Decision Support system: DSS depicts the external representation of the problem domain as well as the problem features (the arrow linking task and system). User and machine are combined, making up a complex system (the arrow between decision maker and DSS). In a semi-structured decisional task, there is a division between what the system can handle and what the decision maker manages. The following figure displays the three cases that can be observed:

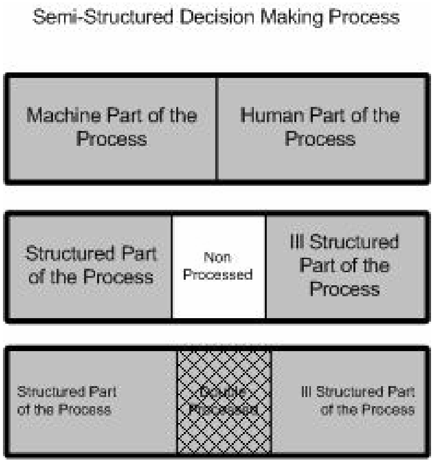

Figure 2 : Task Division between the Decision Maker and his Support System

2.2 How Using Decisional Fit Model?

2.2.1 Decision Making in Natural Settings

Naturalistic decision making paradigm is based on researches led by Klein at the end of 80' and tested an original path to study decision making (Klein, 1998; Klein, Orasanu, Calderwood & Zsambok, 1993; Lipshitz, Klein & Carroll, 2006; Zsambok & Klein, 1997). The principle was quite simple: observing the way decision makers behave in natural settings. This naturalistic perspective led to a relevant result: in context, an expert decision maker coping with a complex, urgent and risky situation does not choose between many options to decide. Decision results from a recognition primed process. In that way, DSS is intended to play a major role at the very beginning of decision process rather than at the end (Lebraty & Pastorelli-Nègre, 2004). That is the reason why the naturalistic decision making perspective is closely linked to situation awareness issues (Endsley & Garland, 2000).

2.2.2 Fit as Gestalt

Viewed broadly, fit can be defined as the alignment of strategy and organizational contingencies firms cope with (Venkatraman, 1990). Among many perspectives developed by literature, "*Fit as Gestalts*" appears to be the more appropriate for our DF model for the two following reasons: (1) Gestalt theory is intrinsically a tested and solid approach. From Wertheimer (1938) to Fuller (1990), this approach refined its results without changing its foundation: "*Gestalt psychology views perception and other mental processes as holistic rather than atomistic in nature*" (Schroeder, 2007); (2) "Fit as Gestalts" matches with the naturalistic decision making paradigm. In this paper, we state that decision making is the result of situation recognition. Hence, the importance of this recognition process is predominant. Recognition process is a kind of image matching. As Adejumo, Duimering & Zhong (2008) mentioned "*This approach considers the cognitive processes involved in the recognition or formulation of an appropriate representation of the problem structure enabling the solution to be obtained. Recognizing the appropriate problem structure coincides with obtaining the solution*" (p. 83).

The following tab describes what fit is in a gestalt perspective:

Key Characteristic	**Perspective of fit as Gestalts**
Underlying conceptualization of fit	Internal congruence
Number of variables	Multiple
Analytical scheme(s) for testing it	Numerical taxonomical methods as cluster analysis or factor analysis
Measure of fit	Ordinal – Interval Measure
Illustrative references	

Tableau 1: Fit as Gestalt

2.2.3 Assessing Relationships in the DF Model

DF model focuses on "fit relationships" between:

1. Task and DSS (called FIT1)
2. Decision Maker and DSS (called FIT2)
3. Decision Maker and Task (called FIT3)

Regarding our research question, we especially focus on FIT 1 and FIT 2 since FIT 3 is not primary related to DSS. FIT 1 questions the level of fitness between task and decision support system. It allows examining in which extent system characteristics respond to decision maker needs to perform task. FIT 2 investigates the level of fitness between decision maker and DSS. It allows to measure in which extent information provided by the system matches with decision makers' internal representations of the problem they deal with.

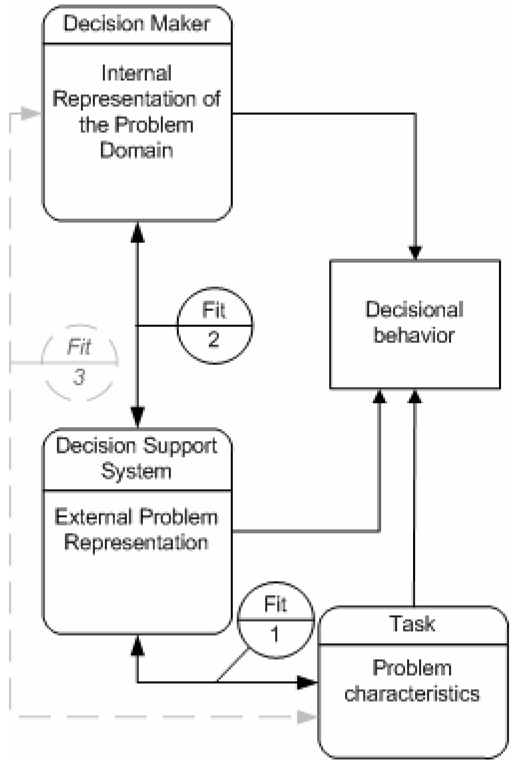

Figure 3: Model studied

In order to achieve measurement of DSS performance, we exploit users' evaluations and perceptions of system. As Davis (1989), Goodhue (1995) and Goodhue, Klein & March (2000) stated, user evaluation of information system is a quite reliable surrogate method to assess its success until development of a strong theoretical underpinnings in MIS literature.

3. Research Method

In order to provide a preliminary test of our decisional fit model, we conducted an explanatory case study (Yin, 2003) in which experts use networking technologies to achieve time speed tasks. We selected an extreme single-case study to explore the significant phenomenon of decisional fit under rare and unusual circumstances (Eisenhardt & Graebner, 2007; Yin, 2003). More precisely, we focused on the networking technology called Link 16, which fits out many NATO fighter aircrafts, such as the American and Belgium F16 and the French Rafale. These aircrafts are currently deployed in Afghanistan. Pilots and navigators have to achieve strike missions, called Close Air Support (CAS), which consist in firing or frightening hostile targets that are in close proximity to friendly forces. When a troop is in contact, the tactical command and control centres promptly task a fighter aircrafts patrol to handle the situation. Pilots act under clock-speed pressure, and hostile circumstances since they used to be targeted by enemy ground fires. In that sense, CAS can be considered as a complex mission.

Within such high-volatile environments (Eisenhardt & Martin, 2000; Wirtz, Mathieu & Schilke, 2007), Link 16 is viewed as a valuable asset since it is able to support fitness between the two components of our model (task and decision maker). However, technologies' usages can deeply affect works practices (Orlikowski & Robey, 1991; Orlikowski, 1992) and generate misfit. We studied the ways pilots and navigators evaluate the effects of Link 16 on mission achievement in focusing on their narratives and perceived values of system.

3.1 Context Setting

3.1.1 Decision Support System: Link 16

The decision support system we studied is called Link 16. It is a wireless decision support system made up of communication technologies (such as instant messaging and a kind of email device) and up-grading tactical databases. Link 16 has been implemented in the Rafale aircrafts recently, at the beginning of 2006. Link 16 provides each networked participant with all transmissions made by others. For instance, a fighter aircraft equipped with Link 16 can receive on its display screen information from other neighbouring fighters, the airborne control system aircraft AWACS, navy ships, and Special Forces units deployed on the battlefield. Such information can concern friendly and enemy airplanes' positions, counter-battery sites, and location of ground forces. Each fighter can display nearly the same picture of the battlespace since what is detected by an aircraft is instantly shared by others. Further, Link 16 is made up of 128 time slots per second, and consequently provides information to a high degree of accuracy.

Link 16 is useful to conduct Close Air Support missions. System collects information from the ground through Joint STARS (Surveillance Target Attack Radar System) airborne that conducts ground surveillance to develop an understanding of the enemy location and to support attack operations. In some cases, AWACS relays Joint STARS information to fighter aircrafts. In effect, unlike US ground forces, French soldiers are not fitted out with Link 16 on the battlefield. As a result, pilots have to collect data in a different way: they use voice channel transmissions with French ground forces and collect other tactical information provided by AWACS via Link 16.

Link 16 has deeply modified the way fighters used to communicate and exchange tactical information (Gonzales, 2005). In effect, the typical voice channel transmissions provide information relatively slowly and can introduce errors due to radio interferences and/or misunderstandings and misinterpretations. In comparison, Link 16 is an information multiplier and a quite reliable decision support system. However, its usage introduces new work practices which are able to question users' current representations of problem domain.

3.1.2 Task: Strike Missions Called Close Air Support

Close Air Support (CAS) is an air action against hostile targets which are in a close proximity of friendly forces. Such a mission provides firepower in offensive and/or defensive operations to neutralize enemies. Execution of CAS operations is covered by rules of engagement (RoEs). They are directives issued by competent military authorities that delineate circumstances and limitations under which encountered forces will conduct combat engagement. Every country edicts its own rules of engagement, depends on its political outlooks. RoEs provide the general framework to conduct CAS operations.

As an element of joint fire support, each service organizes CAS within its roles as part of the joint force. As a result, CAS requires perfect coordination between ground and air forces. Usually, a joint terminal attack controller (JTAC, from the Air force or the Army) leads the action of fighter aircrafts from the ground in transmitting the appropriate information through Link 16 or radio. JTAC communicates the precise target localization and makes sure pilots and navigators have understood the situation on the ground. He is the most qualified service member to perform such activities and assumes all the responsibilities associated to targeting. In rare circumstances, tactical commander might require CAS when no JTAC is available, due to some unforeseen consequence of combat operations. In these instances, aircrews have to step outside their normal boundaries and execute an emergency CAS (ECAS) mission. They try to collect critical information from different sources and via different systems (Link 16 and radio), such as forces on the ground, Joint STARS and/or AWACS, etc. During ECAS, pilots and navigators assume all the responsibilities and risks in weapons deployment.

3.1.3 Decision Makers: Pilots and Navigators

One of the most critical decisions on the battlespace concerns air weapons deployment. In that way, different actors are involved in decision making. At the tactical level, the chain of command is made up of the Combined Air Operation Centre (CAOC), which commands and controls a fleet of hundreds allied aircrafts, and the Air Support Operation Centre (ASOC), which serves as the air component's lead for executing CAS operations according to priorities of fire. As a result, decision to go to support friendly forces is only made by chain of command. It plans and organizes CAS missions from the beginning to the end. Pilots strictly apply these plans, in accordance with the Air Tasking Order (ATO) they received from CAOC around 70 hours before taking off.

Pilots and navigators have to conduct their mission in line with this ATO. When they arrive above combat area, they decide the way they will handle the situation. Bombardment will be done with regards to RoEs impositions. If circumstances do not allow enforcing RoEs, aircrews have to choice another way, in agreement with JTAC, or alone in case of Emergency CAS. For instance, they can realize show of force in order to frighten enemy forces, without shooting them.

As a result, pilots and navigators assume large responsibilities on the battlefield. That is the reason why French Air Force has sent its best fighters in Afghanistan. Currently, six Rafale are engaged over there. Aircrews have thousands hours of flight and they used to train together all year long. They are based in Kandahar and are involved in all kinds of CAS.

3.2 Data Collection

We used mixture data collection methods to achieve triangulation. In that way, we sought to enhance confidence in our findings (Eisenhardt, 1989) and to provide an appropriate level of internal validity (Miles & Huberman, 1994). Data sources included individual and collective interviews, archival records, and reports from the field. We collected primary and secondary data. Concerning the former, eight semi-structured interviews were realized with pilots and navigators of Rafale. Each interview lasted on average one hour and a half and were tape-recorded and transcribed. We followed an interview guide which focused on Link 16 usages on the Afghan battlefield and its unexpected effects. We encouraged narration in order to grasp the ways pilots use Link 16 to make decision in action, under stressing, hostile and time-pressure conditions. We also interviewed an AWACS mission commander who is used to command and control the battlespace with Link 16. He narrated his experiences and his viewpoints concerning the advantages and the limitations of such a decision support system. This meeting has been the opportunity to observe how Link 16 works since we attended to an air operation simulation. Further, we gathered French after-action reports from the field as well as from NATO training exercises. They concerned pilots reviews related to the impact of Link 16 on mission improvement, and potential problems they had to deal with. Finally, we collected data concerning French doctrinal vision of Link 16, in studying internal archives and interviewing three high-ranking French Air force officers assigned to think the near-future evolutions of Link 16.

Concerning the secondary data collection, we interviewed 9 pilots of Mirage-5 and 6 pilots and navigators of Mirage 2000D to understand the way they work without Link 16. They allowed us to improve our knowledge of pilot's skills and competences. These interviews have been also the opportunity to thoroughly understand in which extent Link 16 introduces changes in work practices. Further, we studied American institutional monographs published by think-tanks such as the Rand Corporation and the CCRP, documentations from the Department of Defense (DoD), and US Air force after-action reports from Afghanistan and Iraq. In effect, American forces have more experience than French Air force concerning Link 16 usages on the battlefield and can easier stand back to assess its effects on mission achievement.

3.3 Data Analysis

In order to assess the effect of Link 16 on decisional fit, we had to document and analyse pilots and navigators' evaluations and perceptions related to the ways this system has modified mission achievement. To do this, the data analysis was conducted in two main steps: coding and writing monographs. Concerning the coding, we used the qualitative analysis software called N-Vivo7 to categorize our observations, field notes, and interviews transcripts. We first created main categories, 'down' from our research questions and design, and then we produced new nodes 'in vivo' from the words, sentences and/or paragraphs. Using queries, we produced qualitative matrix displays in order to compare multiple pairs of items and to build an overall pattern of our data.

Concerning the second step of data analysis, monograph was produced for each interview realized and sent to interviewees. Feedbacks allow us to refine our observations and go deeper into our understanding of the role played by Link 16 on decision performance (Vaast & Levina, 2006).

4. Results

Overall, pilots and navigators' perception of Link 16 is quite positive. They all agree that Link 16 significantly improves the way they achieve air operations. 66.05% of interviewees spontaneously point out that Link 16 enhances mission capabilities in increasing information quality and share-abilities:

"I can use a metaphor: before [Link 16], we used to run in a tunnel with only torchlight to guide us. Now, with Link 16, you'd switched the light on."

"With Link 16, it becomes simple to perform task. Without Link 16, it's hell."

In addition to such general comments, line-by-line coding of the materials revealed that pilots and navigators evaluate the level of fitness in a different way, whether they focus on task or decision maker.

4.1 FIT 1: analysing the level of fitness between task and decision support system

As we argued previously, in questioning the level of fitness between task and decision support system, we seek to understand in which extent system characteristics respond to pilots' task needs to perform combats. Data analysis shed light on two main results: (1) pilots and navigators consider that the ways Link 16 provides information dramatically reduce risks of data misinterpretation and ambiguity. However, (2) users evaluations also reveal that it is possible to improve characteristics of Link 16 in order to increase the level of fitness.

4.1.1 Link 16 Usages Increase Task and Decision Support System Conformity

Answers to the open-ended question "How the network works [in Afghanistan]?" provided detailed information on Link 16 technological characteristics. In comparison with the way they used to conduct air operations with Mirage, pilots and navigators noticed two main technological improvements. They are related to the quality of (1) visual presentation of the tactical situation and (2) intraflight (between aircrafts and between aircrafts and AWACS) and extraflight (between aircrafts and ground forces) communications. In that way, system's characteristics appear to be in line with pilots' task needs.

Concerning representation of the tactical situation, Rafale pilots and navigators are provided with continually updated tracks which visually displayed the precise location and velocity of detected aircrafts, counter-battery sites and/or ground forces. Different icons appear on the display to indicate the nature of the track (friend, enemy or unknown). For instance:

"With Link 16, you gonna see UAVs [Unmanned Air Vehicles]. You gonna have a little symbol on your screen. Other icons tell you "keep careful, there's a counter-battery site over there!" or visually, graphically show you that the fuel tanker's getting away."

"*The key of decision? Getting a good representation of operational situation!"*

In addition, symbols are coloured to provide information related to the origin of detections. In that way, pilots immediately know if tracks are transmitted by AWACS, Special Forces or by its own radar system. Such extra information also indicates whether a track has been merged or not by system Merging operations are critical since they allow pilots to collect simplified information on their display. As a result, they do not have to manually differentiate between many tracks and analyze each of them anymore:

"Link 16 implementation is a mean to pretty improve information gathering and reduce manual tasks."

The second technological improvements perceived by pilots concerns quality of communication between aircrafts and between aircrafts and ground forces. Before Link 16, the main communication channel was radio transmission. Pilots and navigators had to continually listen to voice traffic (from AWACS) describing air traffic, mentally convert each description into a location and develop an appropriate tactical response. In addition, they had to communicate (in English) with JTAC in order to obtain the precise target localization and thoroughly understand the situation on the ground. With Link 16, the most part of voice transmissions is digitalized. Tactical data which come from AWACS and ground forces are automatically transmitted through system and pilots do not have to spend efforts and time in radio exchanges anymore:

"With Link 16, we quite limit talking."

4.1.2 Link 16's Technological Characteristics Could Be Improved

Through pilots and navigators' perceptions of Link 16 are globally positive, they shed light on some improvements that could increase the level of fitness. More precisely, they often notice the risk of information overload due to merging issues. In rare circumstances, numerous sensors are able to detect the same track at a time. On-board computers can become saturated and fail to perform merging operations. As a result, threat can be overestimated and tactical situation can be distorted. Pilots and navigators have to deal with such risks.

"It's crazy all information you get and you have to process!"

"The most important risk is splitting. When tracks manoeuvre, merging operations can be delayed."

4.2 FIT 2: Analysing the Level of Fitness between Decision Maker and Decision Support System

With FIT 2, we seek to understand in which extent information provided by system matches with pilots and navigators' internal representations of the problem they deal with. Material coding shows that Link 16 usages tend to appreciably improve decision makers and system complementary. However, such usages could lead to question the current decision model.

4.2.1 Link 16 Usages Enhance Pilots/Navigators and System Complementary

Pilots and navigators' perception of Link 16 clearly indicates that their internal representation of the problem fits with the external representation proposed by system. To put it another way, pilots' expectations of what the problem domain will be match with the way Link 16 represents it (form and content).

Indeed, when they answered to the open ended question "How are you evaluated the contribution of Link 16 to air operations [included CAS]?" many of them stressed on the reduction of cognitive workload they take advantage of. No mental calculation is required anymore and they can collect information much faster and accurate:

"With Link 16, you don't feel overloaded anymore."

"Tasks related to information management are pretty reduced now; Link 16 handles much of them."

The resulting of such time and cognitive workload compression is freed time saving. This freed time can be used to reckon more alternative courses of action and to make more decisions in a given period of time. Moreover, instead of spending their time to gather and monitor data, they can focus on the essential steps of their mission, which means refining tactics and developing sense-making:

"You can dedicate your capacities to tactics."

"*With Link 16, it becomes possible to conduct instinctive fights."*

4.2.2 Toward Another Decision Making Model?

These additional capabilities are critical under stressing conditions of combat. In effect, they can allow pilots to increase the combat speed and finally engage and destroy more targets:

"Link 16 allows doing something fabulous: increasing combats' speed. Actually, you can avoid being seen by others. Your enemies? They still process mental calculation."

The feeling that Link 16 is able to accelerate time and provide combat superiority is shared by many interviewees. It is possible to reckon that, with such a decision support system, the way they make decision could change. More precisely, the current decision model learned by each pilot and navigator at a time or another could be questioned. This model is called OODA (Observation, Orientation, Decision and Action). It proposes four basic processes in decision making, which are performed in a cyclical sequence. The "Observe" step is about information gathered by all means available (human as well as technological). The "Orient" step concerns the analysis of this information. It is primarily focused on human abilities to process information. Command and control units as well as pilots and navigators interpret information in order to create a coherent representation of the situation and its implication. The "Decide" step is related to the choice of the appropriate action. Finally, the "Act" step is about decision implementation.

OODA model could be refined, in taking into account the higher level of complementary provided by Link 16. For a large part, analysis of the tactical situation is processed by the system. Even if the "Orient" step is still based on human capabilities, Link 16 significantly supports creation of a relevant picture. The modern battlespace can be seen as an environment of transparency, where data are quasi-instantaneously available. In that way, fighters do not significantly gain advantage from observation since they could all collect and see same data. Orientation is even more important since data is worthless without analysis and interpretation. In that way, pilots and navigators' abilities to process and exploit data provided by system into practical knowledge is becoming critical to perform air missions.

5. Conclusion

In this paper, we used Decisional Fit Model to analyze the impact of a new Decision Support System, Link 16, on decision performance. We discussed that this new system fits well with the internal representations of decision-maker and task characteristics it has to support. The broad result is that this net-centric decision support system leads to enhancement of decision performance. However, some improvements could be done, especially concerning decision model learned and usually exploited by pilots. This OODA model could be refined to fit better with decisions that pilots have to make in real situations.

However, our study presents some limitations. Mainly, it is outstanding to acknowledge the fact that users' evaluations of DSS in order to appreciate its success cannot be considered as an objective measure (Goodhue et al., 2000). Our research does not explicitly put into test correlation of pilots' and navigators' evaluations of Link 16 with objectively measured performance. Such a perspective could lead to more interesting studies in the future.

Acknowledgements

The authors thank sincerely Ms. Diane Rajaona[3] for grammatical and style review in this communication.

References

Adejumo, G., Duimering, P. R., & Zhong, Z. 2008. A balance theory approach to group problem solving. *Social Networks, 30(1)*: 83-99.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. 1989. User acceptance of computer technology: a comparison of two theoretical models. *19(2)*: 982-1003.

Eisenhardt, K. M. 1989. Building Theories from Case Study Research. *Academy of Management Review, 14(4)*: 532-550.

Eisenhardt, K. M., & Graebner, M. E. 2007. Theory Building From Cases: Opportunities And Challenges. *Academy of Management Journal, 50(1)*: 25-32.

Eisenhardt, K. M., & Martin, J. A. 2000. Dynamic capabilities: what are they? *Strategic Management Journal, 21(10/11)*: 1105.

Endsley, M. R., & Garland, D. J. 2000. *Situation Awareness Analysis and Measurement*. Hillsdale: Lawrence Erlbaum Associates.

Farrington-Darby, T., & Wilson, J. R. 2006. The nature of expertise: A review. *Applied Ergonomics, 37(1)*: 17-32.

Fuller, D. A. 1990. *Insight into value: An exploration of the premises of a phenomenological psychology*. New York: State University of New York Press.

Gonzales, D. 2005. *Network-centric operations case study : the Stryker Brigade Combat Team*. Santa Monica, CA: Rand Corp.

Goodhue, D. L. 1995. Understanding user evaluations of information systems. *Management Science, 41(12)*: 1827.

Goodhue, D. L., Klein, B. D., & March, S. T. 2000. User evaluations of IS as surrogates for objective performance. *Information & Management, 38(2)*: 87-101.

Goodhue, D. L., & Thompson, R. L. 1995. Task-Technology Fit and Individual Performance. *MIS Quarterly, 19(2)*: 213-236.

Gorry, G. A., & Scott Morton, M. S. 1989. A Framework for Management Information Systems. *Sloan Management Review, 30(3)*: 49-61.

Hung, S. Y. 2003. Expert versus novice use of the executive support systems: An empirical study. *40(3)*: 177-189.

Klein, G. 1998. *Sources of Power How People Make Decisions*. Cambridge: MIT Press.

Klein, G., Orasanu, J., Calderwood, R., & Zsambok, C. E. 1993. *Decision Making in Action*: Ablex Publishing Company.

Lebraty, J. F., & Pastorelli-Nègre, I. 2004. Biais cognitifs : quel statut dans la prise de décision assitée ? *, 9(3)*: 87-116.

Lipshitz, R., Klein, G., & Carroll, J. S. 2006. Introduction to the Special Issue. Naturalistic Decision Making and Organizational Decision Making: Exploring the Intersections. *Organization Studies, 27(7)*: 917-923.

Miles, M. B., & Huberman, M. 1994. *Qualitative Data Analysis: An Expanded Sourcebook (2nd Edition)*: Sage Publications.

Orlikowski, W., & Robey, D. 1991. Information Technology and the Structuring of Organizations. *Information Systems Research, 2(2)*: 143-169.

Orlikowski, W. J. 1992. The Duality Of Technology: Rethinking The Concept Of Technology In Organizations. *Organization Science, 3(3)*: 398-427.

Schroeder, H. W. 2007. Place experience, gestalt, and the human-nature relationship. *Journal of Environmental Psychology, 27(4)*: 293-309.

ThÃ³rlindsson, T. r. l. 1982. Icelandic Sociology: National Conditions and the Emergence of a New Discipline. *Acta Sociologica (Taylor & Francis Ltd), 25*: 79-89.

Vaast, E., & Levina, N. 2006. Organizational Redesign in an IT Organization. *Organization Science, 17(2)*: 190-201.

Venkatraman, N. 1990. Performance Implications Of Strategic Coalignment: A Methodological Perspective. *Journal of Management Studies, 27(1)*: 19-41.

Webster, J., & Watson, R. T. 2002. Analyzing the Past to Prepare for the Future: Writing a Literature Review. *MIS Quarterly, 26(2)*: xiii-xxiii.

Wertheimer, M. 1938. Laws of organization in perceptual forms. In W. Ellis (Ed.), *A sourcebook of gestalt psychology*: 71-88. London: Routledge & Kegan Paul, Trench, Trubner & Company

Wirtz, B. W., Mathieu, A., & Schilke, O. 2007. Strategy in High-Velocity Environments. *Long Range Planning, 40(3)*: 295-313.

Yin, R. K. 2003. *Case study research : design and methods* (3rd ed.). Thousand Oaks, California: Sage Publications.

Zigurs, I., & Khazanchi, D. 2008. From Profiles to Patterns: A New View of Task-Technology Fit. *Information Systems Management, 25(1)*: 8.

Zsambok, C., & Klein, G. 1997. *Naturalistic Decision Making*. Hillsdale: Lawrence Erlbaum Associates Publishers.

[3] Diane Rajaona - Information Management & Security-Devoteam Consulting.